

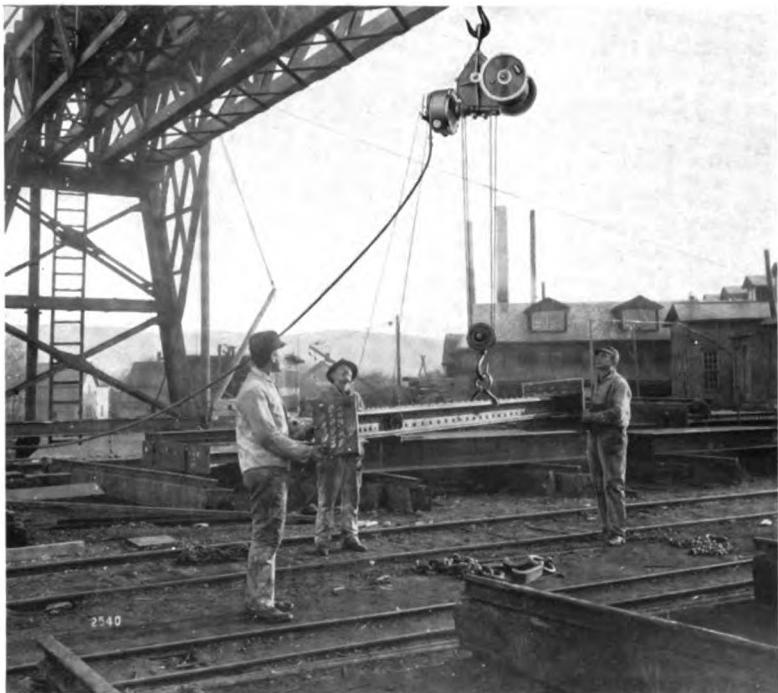
"IMPERIAL" MOTOR HOISTS  
& STATIONARY MOTORS

Ingersoll-Rand Company

11 BROADWAY, NEW YORK

Form No. 8006

February, 1911



"Imperial" Hoist Handling Structural Steel

THE quick and economical handling of work and materials is of vital importance in the industrial field today. Lifting and hoisting done by machine instead of by hand saves labor and time. Floor space otherwise cumbered is kept clear for new work. The time required for passing a job from one stage of production to another is reduced. Efficient, handy and reliable hoisting devices are being more and more recognized as actually effective in reducing production costs, increasing output and adding to the profits.

The "Imperial" Motor Hoist is a machine which has demon-

## **"IMPERIAL" MOTOR HOISTS AND STATIONARY MOTORS**

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strated its superiority, its money-making capacity, in such a diversity of fields that it may be said to be the "standard" hoist for this class of light hoisting. With hundreds of these machines in use, a failure is yet to be recorded against them, and "repeat orders" evidence the entire satisfaction of the trade.

The "Imperial" Hoist is entirely distinct from the direct-acting piston or plunger hoist or lift. It consists of a high-duty air motor geared to a hoisting drum by a mechanical train giving the highest possible efficiency. Combined with this efficiency are moderate weight, extreme compactness, low head-room, absolute safety, perfect control, steadiness in operation, freedom from vibration, and the utmost simplicity and durability. The word "high-duty" exactly describes the "Imperial" Hoist.

### **The Motor**

The motor is of the standard type used on the well-known "Imperial" line of pneumatic drills and reamers. It is a balanced three-cylinder air engine operating with a lower air consumption per unit of power than any other pneumatic motor.

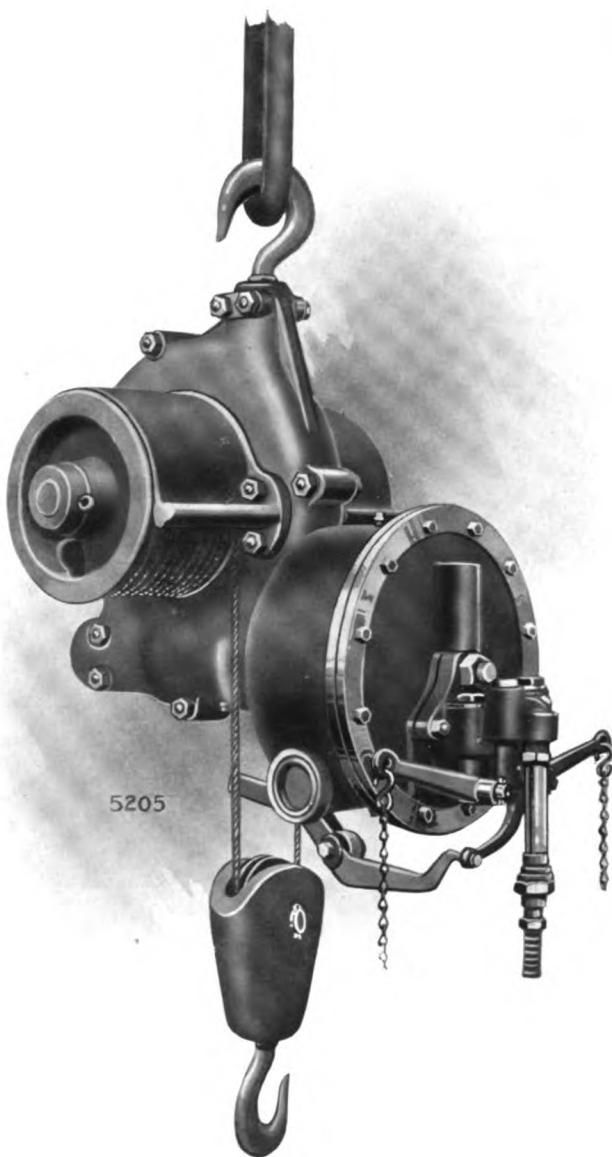
The machine is "valveless" in the sense that no separate part is required for the control of the air admission and exhaust. Air is admitted and discharged through ports in the crank, which is of large diameter and so designed that all ports and passages are shorter than in any other piston motor. The three radial cylinders are bored from a rough casting and rotate about the crank. Their bearing is bushed with a taper bronze sleeve, wear on which is taken up by simply driving up on the taper. Since the thrust of the pistons is always outward, and pressure always exerted between piston and cylinder heads, the cylinders are always forced to a tight seat on the crank, and leakage of live air is practically impossible. The exceptionally short ports, and this precaution against leakage of live air, are two important factors in reducing the air consumption of the "Imperial" Motor Hoist below that of any other.

### **Bearings**

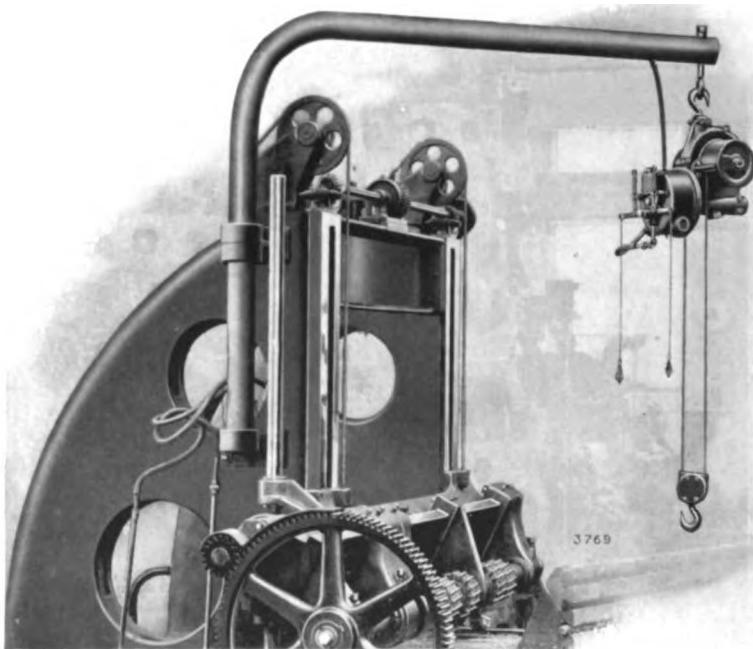
All motor parts are of superior materials, steel being largely used except for such parts as bushings and pistons, which are of the best phosphor bronze. The motor and gear casing are of cast iron. Every bearing has a removable bushing, and wear can be made good by simply substituting a new bushing for a worn one. There are no "steel-on-steel" bearings, and no other motor is so completely bushed throughout. The frames run on ball bearings of large diameter, with removable ball runs flooded with oil.

**"IMPERIAL" MOTOR HOISTS AND STATIONARY MOTORS**

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**Standard "Imperial" Motor Hoist, Nos. 1 and 2**



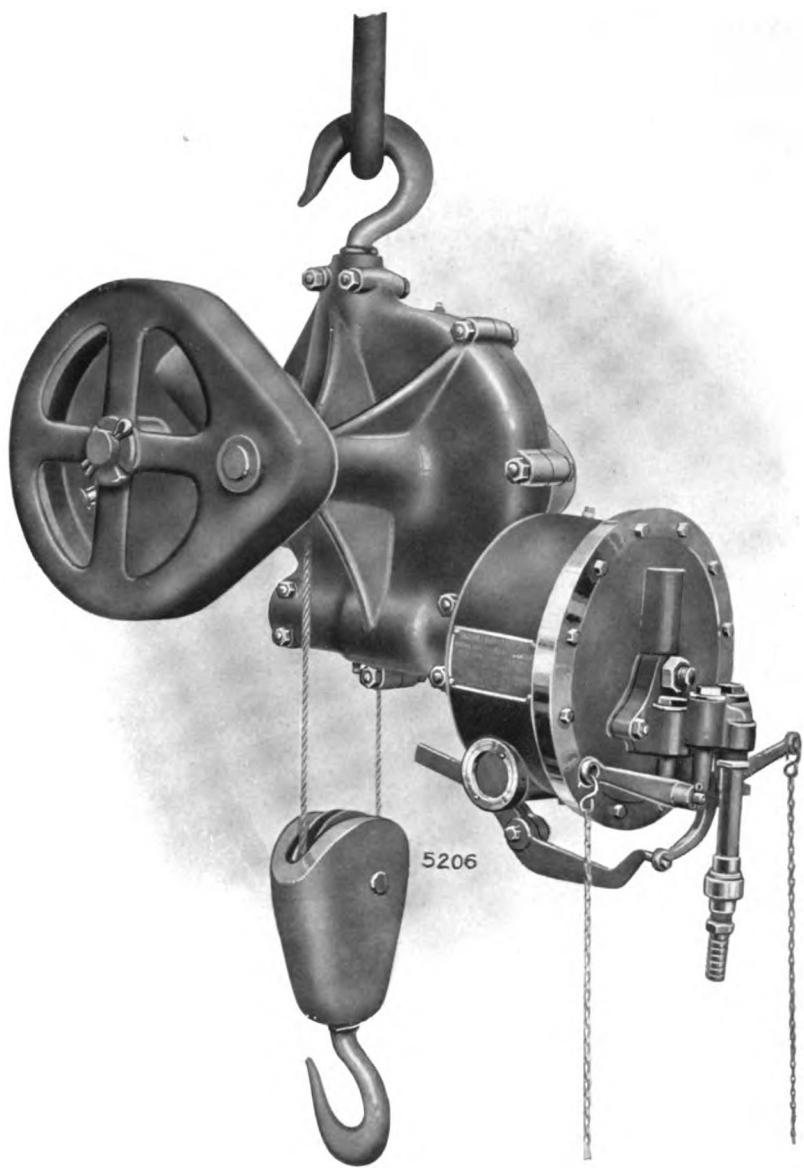
One of Several "Imperial" Motor Hoists at the Bullock Electric Company's Plant,  
East Norwood, Ohio

## Gearing

The worm gearing on the "Imperial" Hoist between motor and rope drum maintains the same high standard of efficiency and durability that marks the motor itself. In all sizes it is wholly enclosed in a dust-proof and oil-tight casing. Its bearings are bushed with removable phosphor bronze bushings. In the two smaller sizes, Nos. 1 and 2, there is but one speed reduction between motor and drum shaft, consisting of an accurately cut worm and wheel. In the larger sizes, Nos. 4, 7 and 10, two speed reductions are used. The first is through a worm and wheel, the second through an accurately cut spur gear and pinion. The worm, driven directly from the motor shaft, is of high-carbon steel and meshes with a bronze worm wheel of large diameter. This worm gearing is of the high-speed type, running in a bath of oil. Tests have repeatedly shown a mechanical efficiency of over eighty per cent, at once removing all objections which have heretofore held against worm

**"IMPERIAL" MOTOR HOISTS AND STATIONARY MOTORS**

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**Standard "Imperial" Motor Hoist, No. 4**

gearing on the grounds of inefficiency. The thrust in the worm is taken up on a ball bearing. The hoisting drums are machine grooved and there is no wear on the pliable wire rope used.

## Lubrication

No other hoist is so completely lubricated as the "Imperial." The motor casing is partially filled with oil, which, with the machine in operation, is flooded over every part. A glass-covered opening in the motor casing indicates the oil level. Every bearing runs in a literal bath of oil, so that wear is practically eliminated. Since there is no air pressure on the inside of the casing, there is no tendency to blow or force out the oil. Even the exhaust air is excluded from the casing, so there is no opportunity to dry out the bearings or carry off the lubricant. This is an exclusive feature of the utmost importance in its effect upon good wearing qualities. The "Imperial" Hoist is cleanly, for its exhaust does not throw oil over its surroundings.

## The Operating Valve

The operating valve is of the self-centering reversing type, automatically returning to closed position when the chains are released. The controlling chains reach to the floor when the hoist is at a height to provide for the maximum lift. The speed of the hoist is under ready and instant control and is capable of being varied within wide limits.

## The Hook Blocks

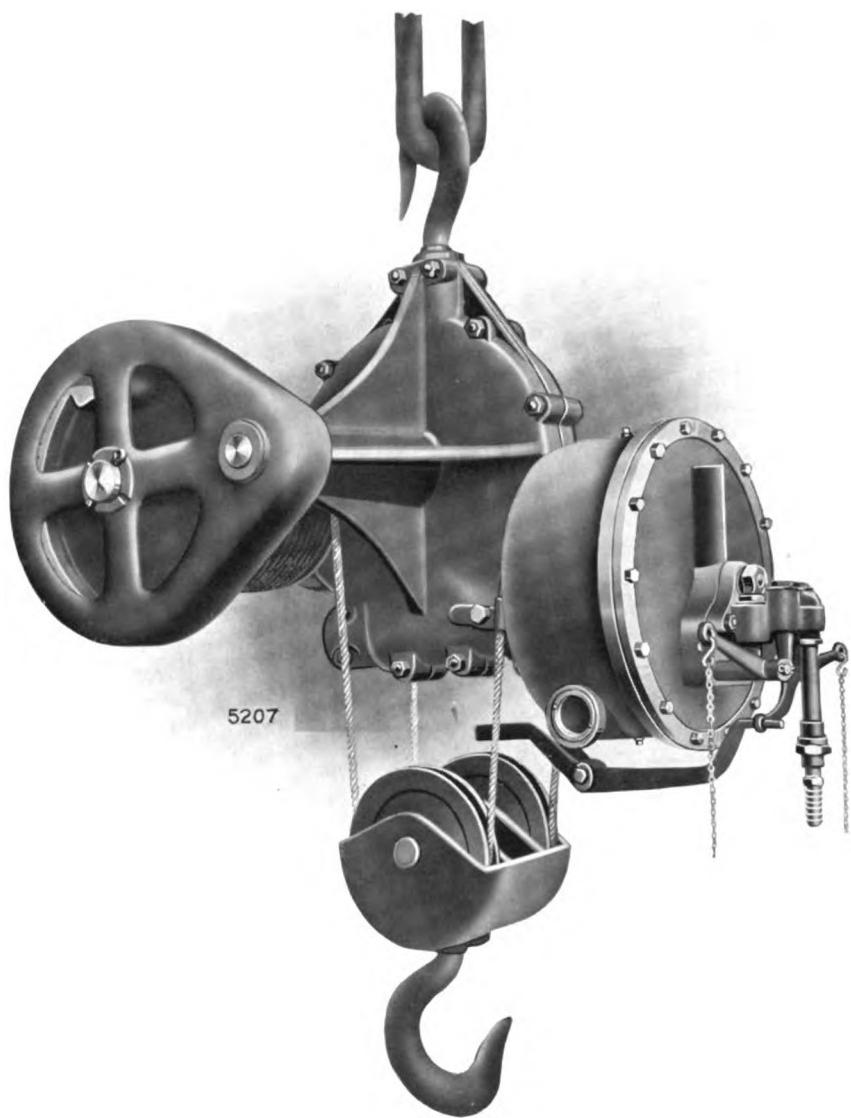
The ball-bearing lower hook block is another exclusive feature of the "Imperial" Motor Hoist. The rope runs over a groove providing compensation on the two drums. As the hook turns on ball bearings, the load may be turned in any direction without twisting the hoisting ropes. More than this, the load will stay in any position in which it is turned without swinging back,—a feature provided on no other hoist, and which will be appreciated by all those having hoisting problems requiring delicate adjustment of load.

## Freedom from Vibration

One of the greatest advantages of the "Imperial" Motor Hoist is its steadiness in action and its absolute freedom from vibration. The motor, being balanced, runs without vibration at all speeds. The worm transmits its motion with perfect uniformity to the gears, and these to the drums. The result is an absolutely steady, uniform

**"IMPERIAL" MOTOR HOISTS AND STATIONARY MOTORS**

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**Standard "Imperial" Motor Hoist, Nos. 7 and 10**

## **"IMPERIAL" MOTOR HOISTS AND STATIONARY MOTORS**

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lift, with no jerks, jars or vibration whatever. The operation of the "Imperial" Hoist, in this respect, is in direct contrast to that of the ordinary spur-gearred or direct-acting hoist.

This vibrationless feature is of special value in foundry work where heavy copies are to be lifted, transferred, swung and lowered without jarring out the sand. The "Imperial" is the only hoist which has satisfactorily met the delicate conditions of foundry hoisting.

The ball-bearing hook block is another feature of great value in this work, as it permits a cope to be turned and accurately adjusted in lowering, with no jerks and with no twisting of the ropes.

### **No Brake Required**

The "Imperial" Hoist requires no brake, and is the only hoist on the market with this valuable feature. The function of the brake is performed by the worm gear which absolutely prevents any running back of the drums under load; and the gear instantly and positively locks, whether in hoisting or lowering, the moment the motor stops. There is not the slightest possibility of slipping or back-lash, even should air pressure suddenly fail. No brake can be so positive as this locked gear. Moreover, any brake soon loses its effectiveness under wear and the presence of oil on the friction surfaces. There can be no deterioration in the locking quality of the worm gear.

### **The Automatic Stop**

An automatic stop is provided on the "Imperial" Hoist which closes the throttle when the load has been raised to the top of its lift. This little refinement prevents injury to the hoist through the carelessness or neglect of the operator.

### **Construction Details**

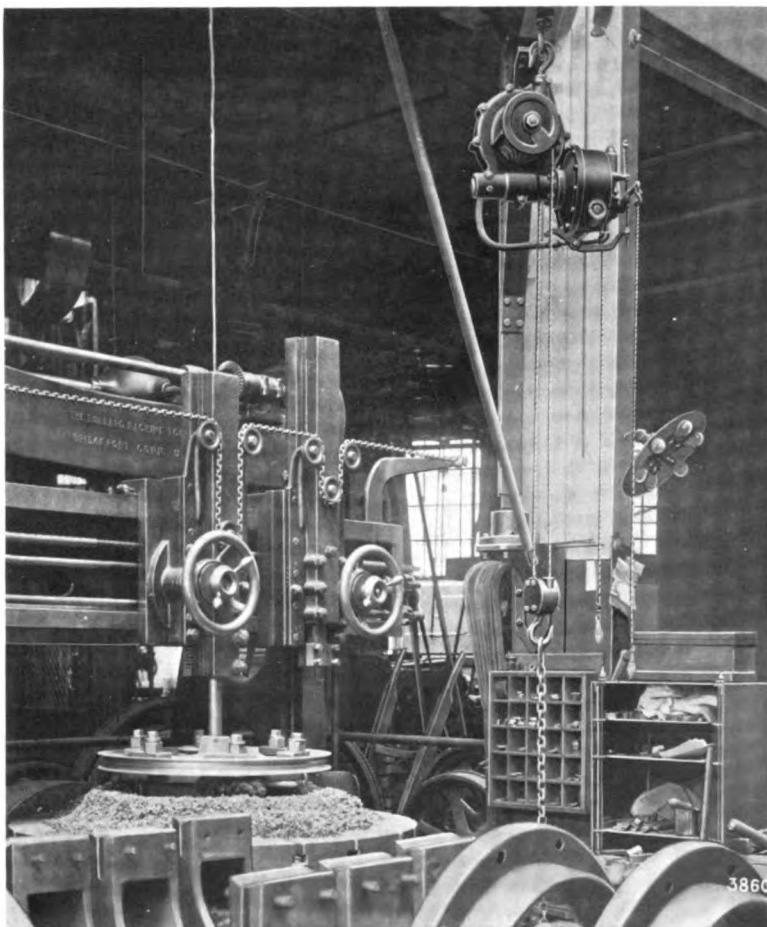
In every detail the design, workmanship and materials of the "Imperial" Motor Hoist are of the highest standard of excellence. Steel parts are hardened or toughened, as the case may be, where experience has shown such treatment to be desirable. The machines are built in a highly organized shop devoted exclusively to the manufacture of small pneumatic tools, and by workmen specially skilled in this exacting class of work. All parts are strictly interchangeable and duplication is guaranteed. The finished product is a hoist

## **"IMPERIAL" MOTOR HOISTS AND STATIONARY MOTORS**

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which is light, compact, powerful, economical and reliable, and unequaled in the refinement of its control and operation.

The "Imperial" Motor Hoist is built in five sizes, having capacities of  $\frac{1}{2}$ , 1,  $1\frac{1}{2}$ ,  $3\frac{1}{2}$  and 5 tons, all with a standard lift of twenty feet. Important facts about the "Imperial" Motor Hoist are tabulated on the following page.

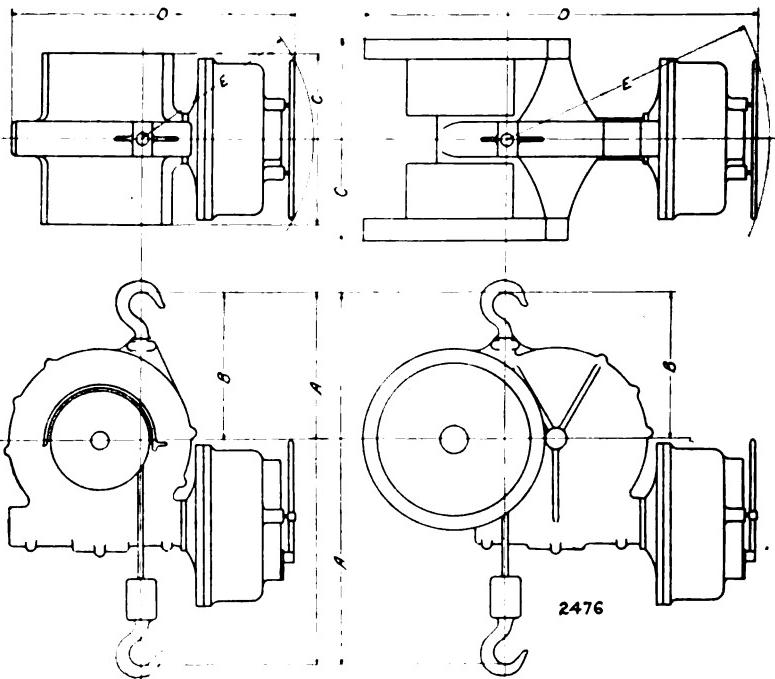


**Serving a Machine Tool in One of the Plants of the Otis Elevator Company**

**"IMPERIAL" MOTOR HOISTS AND STATIONARY MOTORS**

**"IMPERIAL" MOTOR HOISTS**

Size No.	Capacity in lbs.	Ft. Lift Per Minute 80 lbs. Pres.	Maximum Lift Ft.	Size and Length Wire Rope ins. x ft. & ins.	Size Motor	DIMENSIONS Inches									
						Cu. Ft. Free Air Per Min.	Net Weight Pounds	Weight Boxed Pounds	Cu. Ft. Boxed	A	B	C	D	E	
1	1000	32	20	4" x 42' 10"	4	45	270	324	10 <sup>1</sup>	324 <sup>1</sup>	124 <sup>1</sup>	174 <sup>1</sup>	244 <sup>1</sup>	164 <sup>1</sup>	
2	2000	16	20	4" x 42' 10"	4	45	270	324	10 <sup>1</sup>	324 <sup>1</sup>	124 <sup>1</sup>	174 <sup>1</sup>	244 <sup>1</sup>	164 <sup>1</sup>	
4	4000	8	20	4" x 42' 10"	4	45	395	474	13 <sup>1</sup>	40 <sup>1</sup>	134 <sup>1</sup>	204 <sup>1</sup>	324 <sup>1</sup>	244 <sup>1</sup>	
7	7000	7	20	5" x 96' 6"	5	54	80	785	942	27 <sup>1</sup>	46 <sup>1</sup>	184 <sup>1</sup>	294 <sup>1</sup>	39 <sup>1</sup>	21 <sup>1</sup>
10	10000	7	20	5" x 96' 6"	5	54	80	785	942	27 <sup>1</sup>	46 <sup>1</sup>	184 <sup>1</sup>	294 <sup>1</sup>	39 <sup>1</sup>	21 <sup>1</sup>

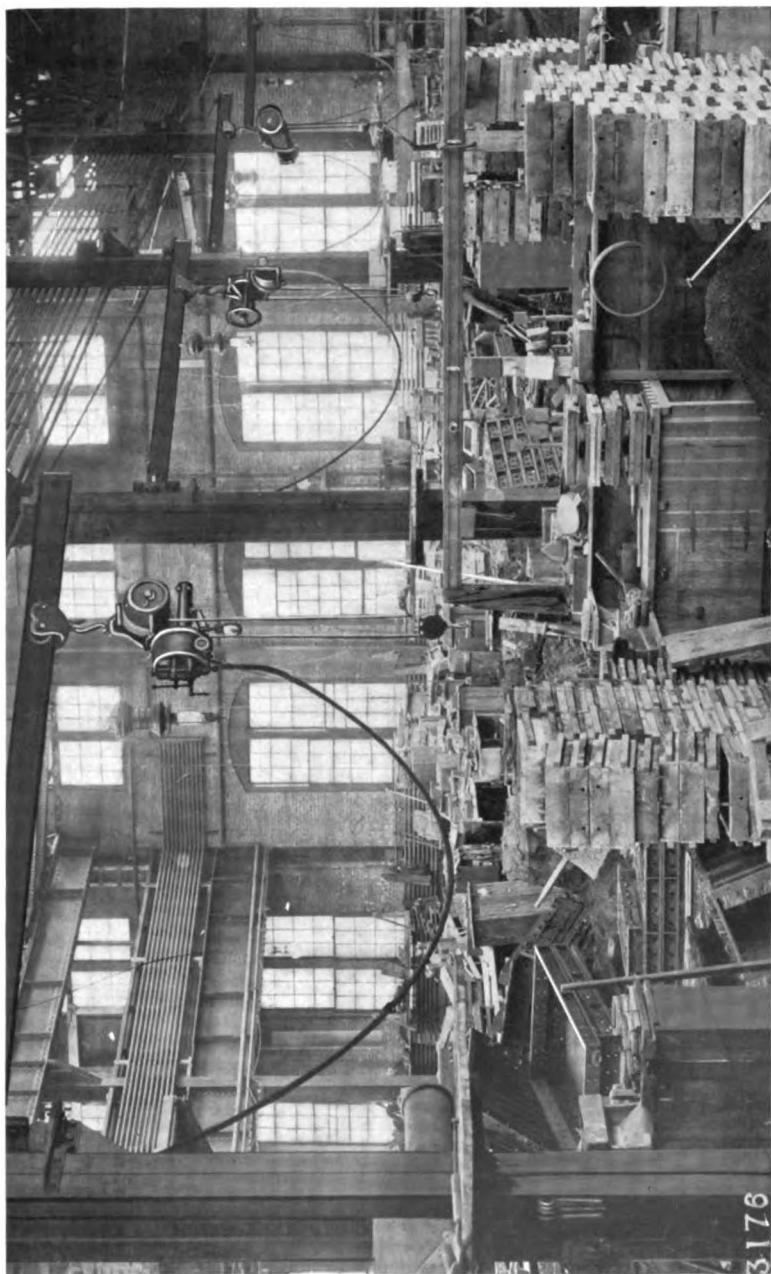


Nos. 1 and 2 Hoists

Nos. 4, 7 and 10 Hoists

**"IMPERIAL" MOTOR HOISTS AND STATIONARY MOTORS**

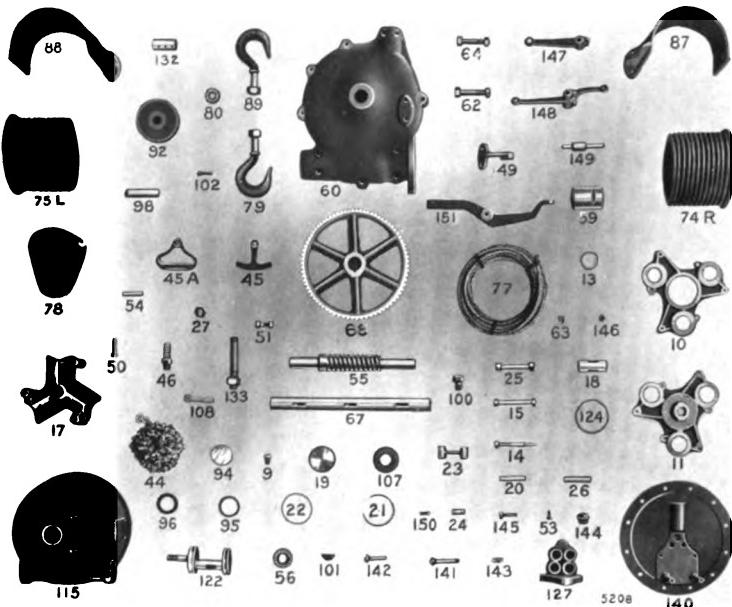
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"Imperial" Motor Hoists in the Shops of the Pratt & Whitney Co., Hartford, Conn.

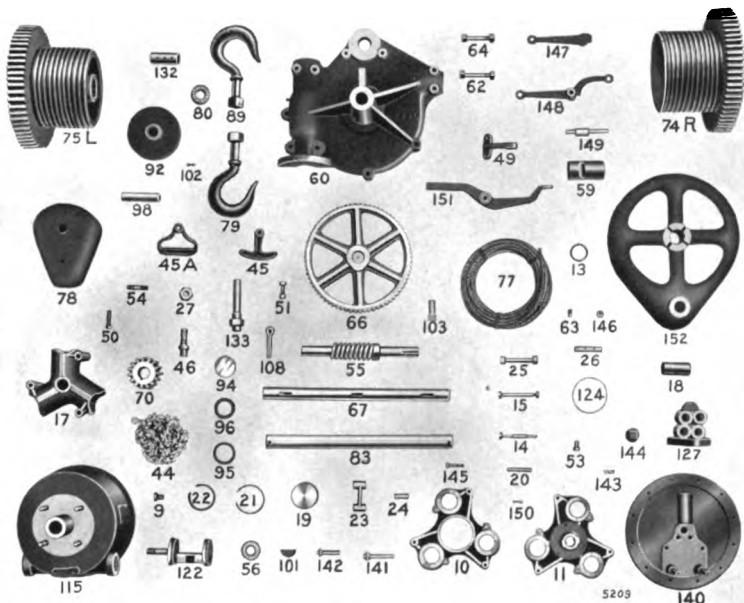
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**"IMPERIAL" MOTOR HOISTS AND STATIONARY MOTORS**



**"Imperial" Hoists Nos. 1 and 2 Duplicate Part List**

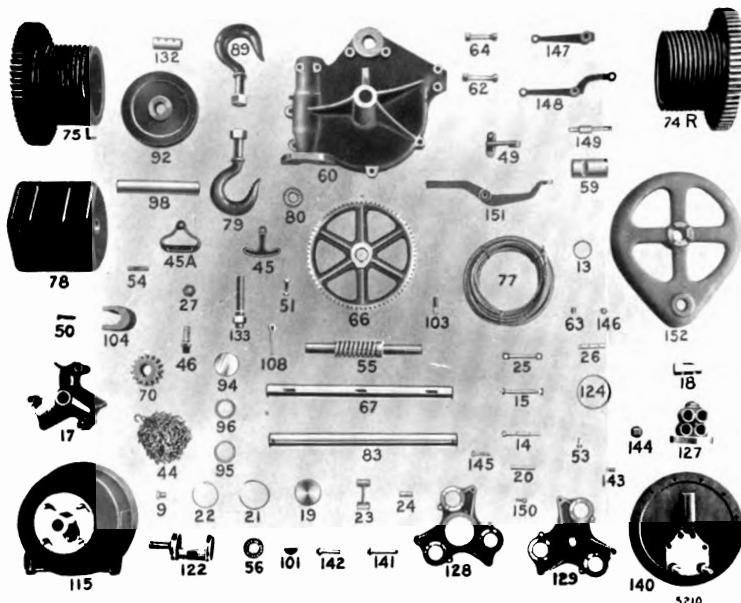
No.	Name of Part	No.	Name of Part
9	Crank Disc Key	75L	Rope Drum (left)
10	Guide Frame	77	Rope
11	Drive Frame	78	Bottom Hook Block
13	Frame Bushing	79	Bottom Hook
14	Frame Bolt	80	Bottom Hook Thrust Bearing
15	Frame Separator	87	Rope Guard (right)
17	Cylinder	88	Rope Guard (left)
18	Cylinder Bushing	89	Top Hook
19	Piston	92	Bottom Hook Sheave
20	Piston Pin	94	Sight Glass
21	Piston Packing	95	Sight Glass Retainer
22	Piston Spring	96	Sight Glass Packing
23	Connecting Rod	98	Bottom Hook Sheave Shaft
24	Rod Bushing	100	Rope Guard, Tap Bolt
25	Roller	101	Drum Key
26	Roller Bushing	102	Sheave Shaft Cotter
27	Crank Nut	107	Drum Shaft Collars
44	Operating Chain	108	Worm Gear Shaft Cotter
45	Operating Chain Handle (raise)	115	Motor Case
45A	Operating Chain Handle (lower)	122	Crank
46	Hose Nipple	124	Frame Ball Cup
49	Stop Lever Fulcrum	127	Valve Chest
50	Fulcrum Screw	132	Worm Cap Bushing
51	Fulcrum Bolt and Nut	133	Hose Connection
53	Motor Case Cover Screw	140	Motor Case Cover
54	Motor Case to Gear Case Stud	141	Live Air Valve
55	Worm	142	Exhaust Valve
56	Worm Thrust Bearing	143	Exhaust Valve Spring
59	Worm Cap	144	Valve Cap
60	Gear Case	145	Valve Chest Bolt
62	Gear Case Bolt (long)	146	Valve Chest Bolt Nut
63	Oil Hole Plug	147	Throttle Lever (left)
64	Gear Case Bolt (short)	148	Throttle Lever (right)
66	Worm Gear	149	Throttle Lever Pin
67	Worm Gear Shaft	150	Throttle Lever Pin Cotter
74R	Rope Drum (right)	151	Stop Lever



### "Imperial" Motor Hoist No. 4 Duplicate Part List

No.	Name of Part	No.	Name of Part
9	Crank Disc Key	74R	Rope Drum (right)
10	Guide Frame	75L	Rope Drum (left)
11	Drive Frame	75	Rope
13	Frame Bushing	78	Bottom Hook Block
14	Frame Bolt	79	Bottom Hook
15	Frame Separator	80	Bottom Hook Thrust Bearing
17	Cylinder	83	Drum Shaft
18	Cylinder Bushing	89	Top Hook
19	Piston	92	Bottom Hook Sheave
20	Piston Pin	94	Sight Glass
21	Piston Packing	95	Sight Glass Retainer
22	Piston Spring	96	Sight Glass Packing
23	Connecting Rod	98	Bottom Hook Sheave Shaft
24	Rod Bushing	101	Drum Key
25	Roller	102	Sheave Shaft Cotter
26	Roller Bushing	103	Drum Shaft Set Screw
27	Crank Nut	108	Worm Gear Shaft Cotter
44	Operating Chain	115	Motor Case
45	Operating Chain Handle (raise)	122	Crank
45A	Operating Chain Handle (lower)	124	Frame Ball Cup
46	Hose Nipple	127	Valve Chest
49	Stop Lever Fulcrum	132	Worm Cap Bushing
50	Fulcrum Screw	133	Hose Connection
51	Fulcrum Bolt and Nut	140	Motor Case Cover
53	Motor Case Cover Screw	141	Live Air Valve
54	Motor Case to Gear Case Stud	142	Exhaust Valve
55	Worm	143	Exhaust Valve Spring
56	Worm Thrust Bearing	144	Valve Cap
59	Worm Cap	145	Valve Chest Bolt
60	Gear Case	146	Valve Chest Bolt Nut
62	Gear Case Bolt (long)	147	Throttle Lever (left)
63	Oil Hole Plug	148	Throttle Lever (right)
64	Gear Case Bolt (short)	149	Throttle Lever Pin
66	Worm Gear	150	Throttle Lever Pin Cotter
67	Worm Gear Shaft	151	Stop Lever
70	Worm Gear Shaft Pinion	152	Gear Guards

**"IMPERIAL" MOTOR HOISTS AND STATIONARY MOTORS**



**"Imperial" Motor Hoists Nos. 7 and 10  
Duplicate Part List**

No.	Name of Part	No.	Name of Part
9	Crank Disc Key	78	Bottom Hook Block
13	Frame Bushing	79	Bottom Hook
14	Frame Bolt	80	Bottom Hook Thrust Bearing
15	Frame Separator	83	Drum Shaft
17	Cylinder	89	Top Hook
18	Cylinder Bushing	92	Bottom Hook Sheave
19	Piston	94	Sight Glass
20	Piston Pin	95	Sight Glass Retainer
21	Piston Packing	96	Sight Glass Packing
22	Piston Spring	98	Bottom Hook Sheave Shaft
23	Connecting Rod	101	Drum Key
24	Rod Bushing	102	Sheave Shaft Cotter
25	Roller	103	Drum Shaft Set Screw
26	Roller Bushing	104	Bottom Hook Block Lock
27	Crank Nut	108	Worm Gear Shaft Cotter
44	Operating Chain	115	Motor Case
45	Operating Chain Handle (raise)	122	Crank
45A	Operating Chain Handle (lower)	124	Frame Ball Cup
46	Hose Nipple	127	Valve Chest
49	Stop Lever Fulcrum	128	Guide Frame
50	Fulcrum Screw	129	Drive Frame
51	Fulcrum Bolt and Nut	132	Worm Cap Bushing
53	Motor Case Cover Screw	133	Hose Connection
54	Motor Case to Gear Case Stud	140	Motor Case Cover
55	Worm	141	Live Air Valve
56	Worm Thrust Bearing	142	Exhaust Valve
59	Worm Cap	143	Exhaust Valve Spring
60	Gear Case	144	Valve Cap
62	Gear Case Bolt (long)	145	Valve Chest Bolt
63	Oil Hole Plug	146	Valve Chest Bolt Nut
64	Gear Case Bolt (short)	147	Throttle Lever (left)
66	Worm Gear	148	Throttle Lever (right)
67	Worm Gear Shaft	149	Throttle Lever Pin
70	Worm Gear Shaft Pinion	150	Throttle Lever Pin Cotter
74R	Rope Drum (right)	151	Stop Lever
75L	Rope Drum (left)	152	Gear Guards
77	Rope		

**"IMPERIAL"**  
**STATIONARY AIR MOTORS**

In many fields there is a growing demand for motors of small power, good economy and satisfactory reliability, to be used for isolated and intermittent service without skilled attendance. Instances of such work are: the operating of small tools or cranes, in shop, foundry, freight yard, warehouse, stone yard and quarry; the driving of small chain or rope drums, winches, small lines of shafting; operating emery, buffing and polishing wheels, fans, etc.

This work demands a motor which shall be ready for duty on a moment's notice, which will not deteriorate under hard service, which will continue to do good work with little attention, which will combine power with extreme compactness, which will demand no expert skill in installation, and the presence of which will not endanger the safety of the plant or of the operator.

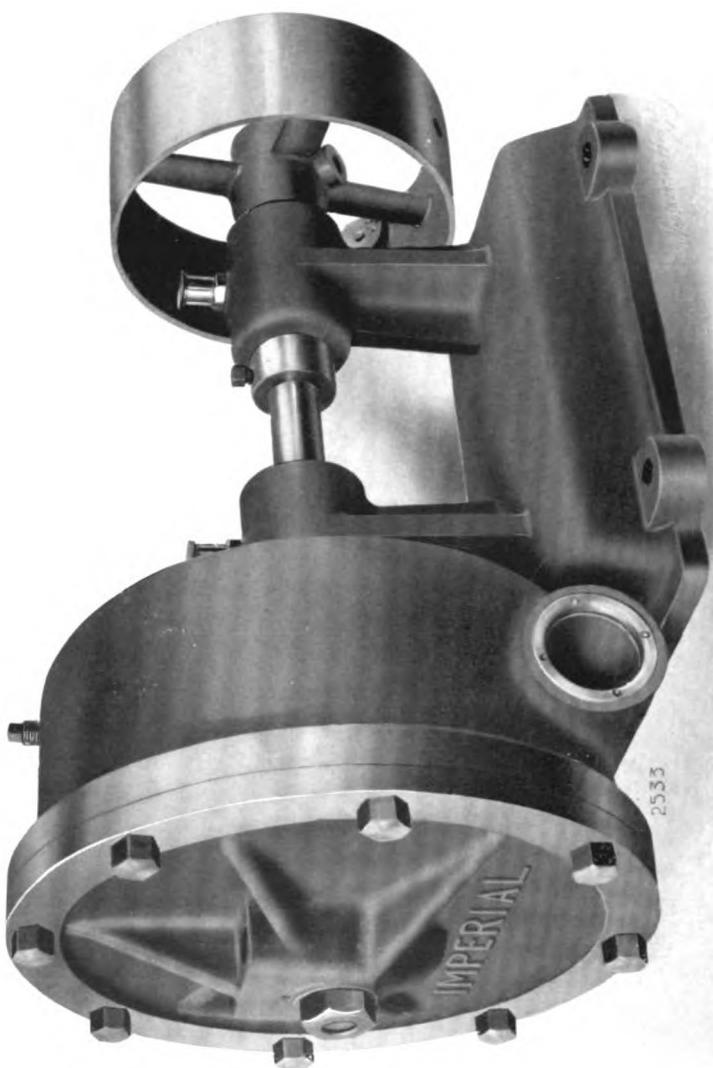
No device so well meets these requirements as the "Imperial" Stationary Motor. Its advantages recommend it above all others for plants where compressed air is already present for other purposes. But its acknowledged superiority has in some cases led to the installation of a compressor plant especially for its operation.

The "Imperial" Motor is a powerful, compact, simple and economical machine requiring the minimum of attention. The motor itself is identical in design and construction with that used in the "Imperial" Hoist, already described in the previous pages of this bulletin. It is wholly enclosed in a dust-proof, oil-tight casing, and is lubricated by the splash system. This casing is mounted on a base which also carries the pulley and shaft bearings, of ample diameter and length. The motor may be mounted on floor, wall or post, or otherwise attached as may be most convenient. Either a pulley or gear may be used on the shaft.

The "Imperial" Motor is furnished in two sizes only, rated at 2 and  $3\frac{1}{4}$  horse-power. The speeds, air consumption and dimensions are tabulated on page 18. Standard motors are non-reversible, but they can be furnished reversible on order, at extra cost.

**"IMPERIAL" MOTOR HOISTS AND STATIONARY MOTORS**

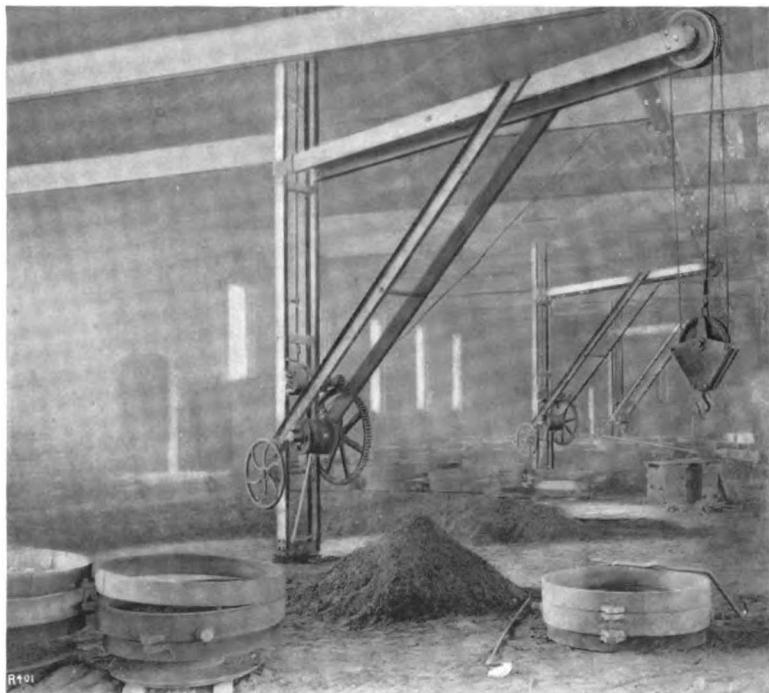
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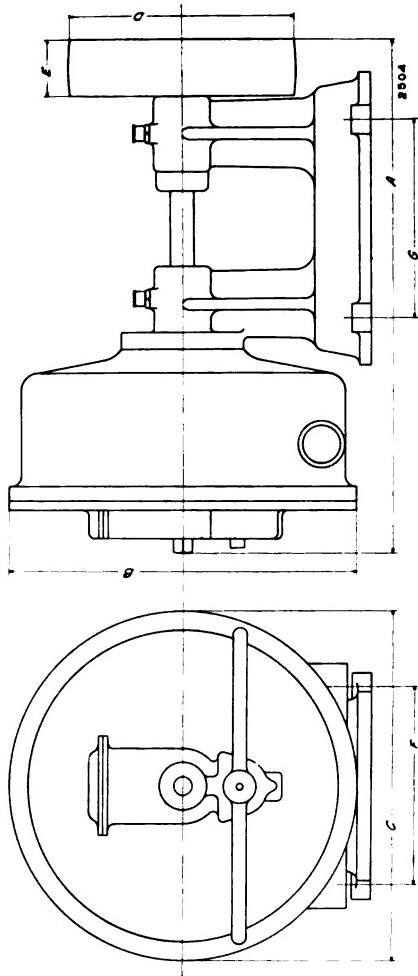
Standard "Imperial" Stationary Motor, Nos. 4 and 10

## **"IMPERIAL" MOTOR HOISTS AND STATIONARY MOTORS**

It should be definitely understood that these motors are not intended for heavy, continuous duty, nor for use with steam. A consideration of prime importance in their design has been the keeping of dimensions and weight at the lowest practical limit. Evidently these considerations forbid as large a factor of safety in their construction as is required in a machine intended to carry its load continuously. The "Imperial" Motor is not intended for such service. But for intermittent work, such as that required in such cases as those already mentioned, no machine gives a better economy or more uniform satisfaction.

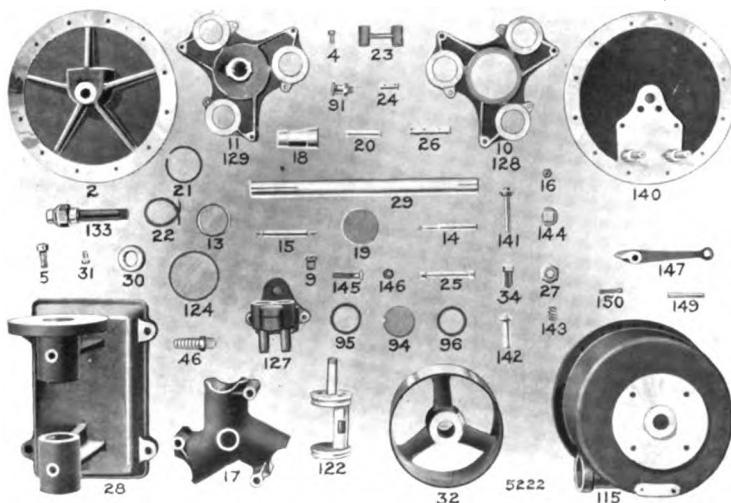


**"Imperial" Stationary Motor on a Jib Crane for Foundry Work. Twelve in use at the Shops of the National Car Wheel Co., Sayre, Pa.**



"IMPERIAL" STATIONARY MOTORS

Size	H. P.	Speed R. P. M.	Cu. Ft. Free Air Per Min.	Weight Pounds	DIMENSIONS Inches				
					A	B	C	D	E
4	2	750	45	129	22 $\frac{7}{8}$	13 $\frac{1}{8}$	12 $\frac{1}{8}$	8	3
10	3 $\frac{1}{4}$	750	80	230	27 $\frac{5}{8}$	17	16	12	4
									10 $\frac{1}{2}$
									8 $\frac{1}{2}$
									10 $\frac{1}{4}$



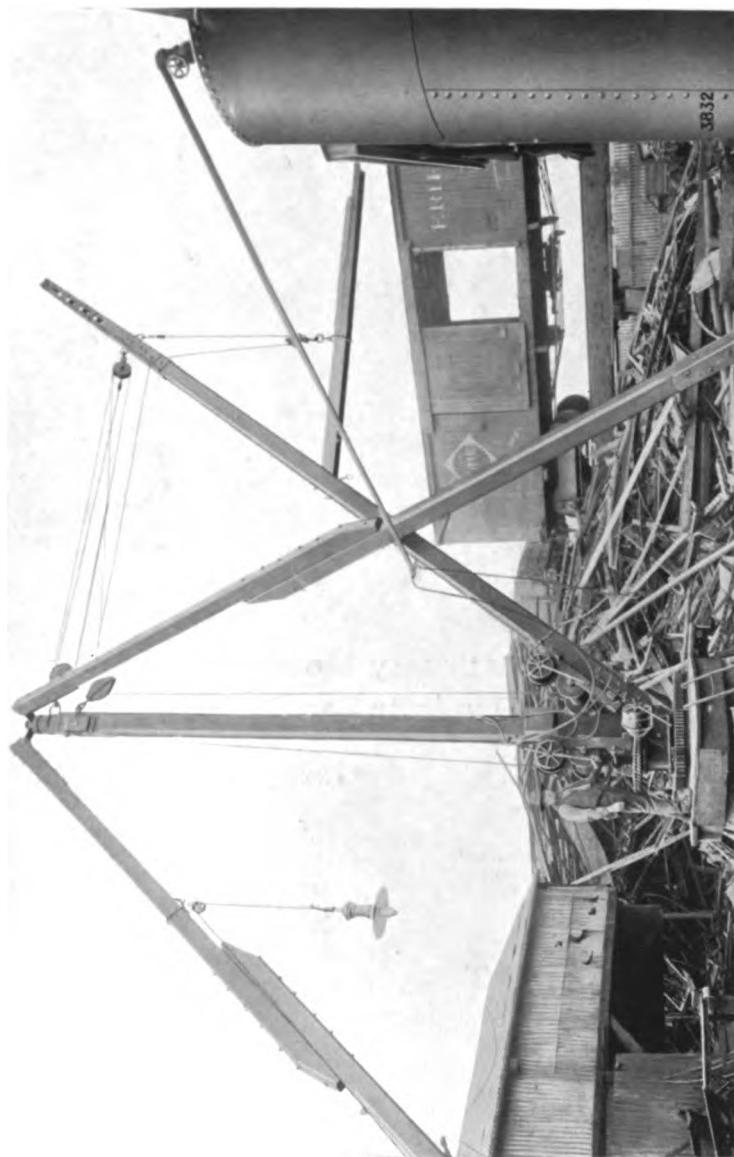
**"Imperial" Stationary Motors Nos. 4 and 10  
Duplicate Part List**

No.	Name of Part	No.	Name of Part
2	Motor Case Cover	32	Pulley
4	Motor Case Cover Screws	34	Pulley Set Screw
5	Case to Base Screws	91	Oil Cup
9	Crank Disc Screws	94	Sight Glass
10	Guide Frame (No. 4 Motor only)	95	Sight Glass Retainer
11	Drive Frame (No. 4 Motor only)	96	Sight Glass Packing
13	Frame Bushing	115	Case
14	Frame Bolt	122	Crank
15	Frame Separator	124	Frame Ball Cup
16	Frame Bolt Nut	128	Guide Frame (No. 10 Motor only)
17	Cylinder	129	Drive Frame (No. 10 Motor only)
18	Cylinder Bushing	The following parts are used on the reversible motor only:	
19	Piston	127	Valve Chest
20	Piston Pin	133	Hose Connection
21	Piston Spring	140	Motor Case Cover
22	Piston Packing	141	Live Air Valve
23	Connecting Rod	142	Exhaust Valve
24	Rod Bushing	143	Exhaust Valve Spring
25	Rollers	144	Valve Cap
26	Roller Bushing	145	Valve Chest Bolt
27	Crank Nut	146	Valve Chest Bolt Nut
28	Motor Base	147	Throttle Lever
29	Pulley Shaft	149	Throttle Lever Pin
30	Shaft Collar	150	Throttle Lever Pin Cotter
31	Shaft Collar Set Screw		

Nos. 10 and 11 answer the purpose for both 10 and 11 and 128 and 129, respectively, and are so numbered on cut.

**"IMPERIAL" MOTOR HOISTS AND STATIONARY MOTORS**

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"Imperial" Stationary Motors on Derrick for Handling Iron at Plant of American Iron and Steel Co., Lebanon, Pa.